

Zion National Park



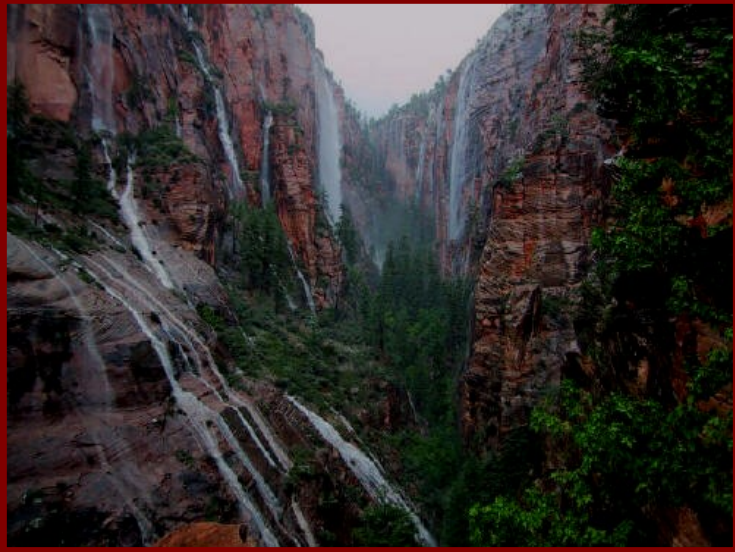
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Fires and Floods in Zion National Park 2006 and 2007

Dave Sharrow



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Telephone Canyon

Zion NP 7-27,2007



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North Creek

Southwest of Zion NP, August 1, 2007



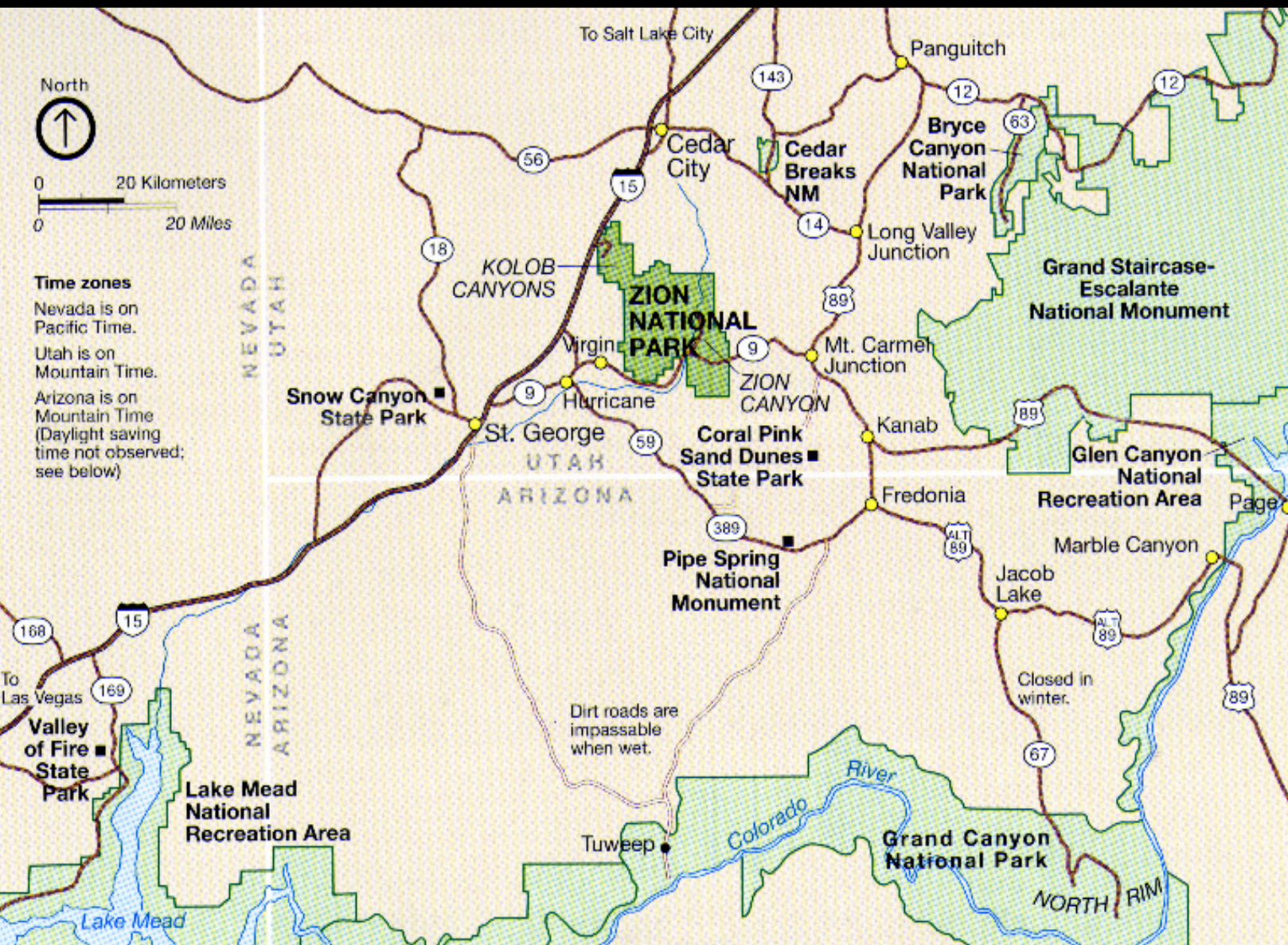
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Zion NP



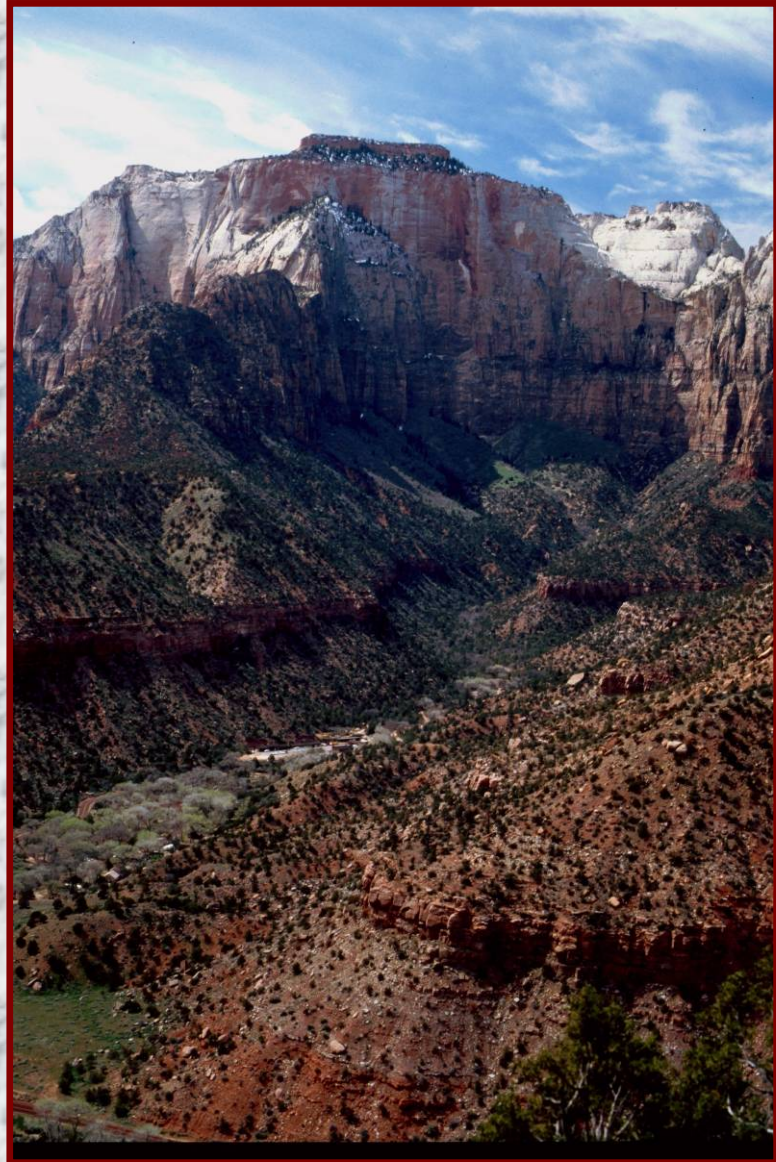
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Canyons of ZION



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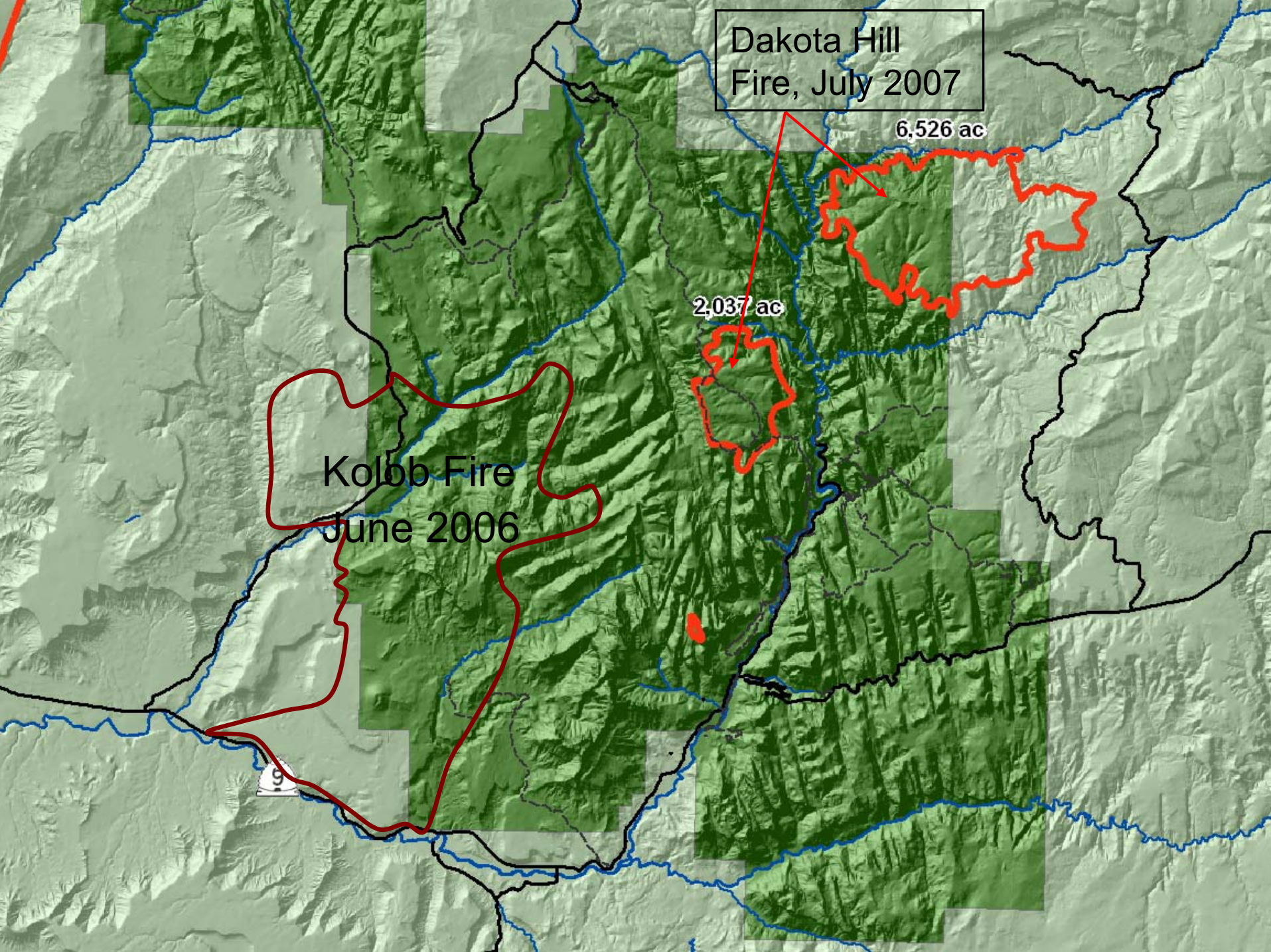
Dakota Hill
Fire, July 2007

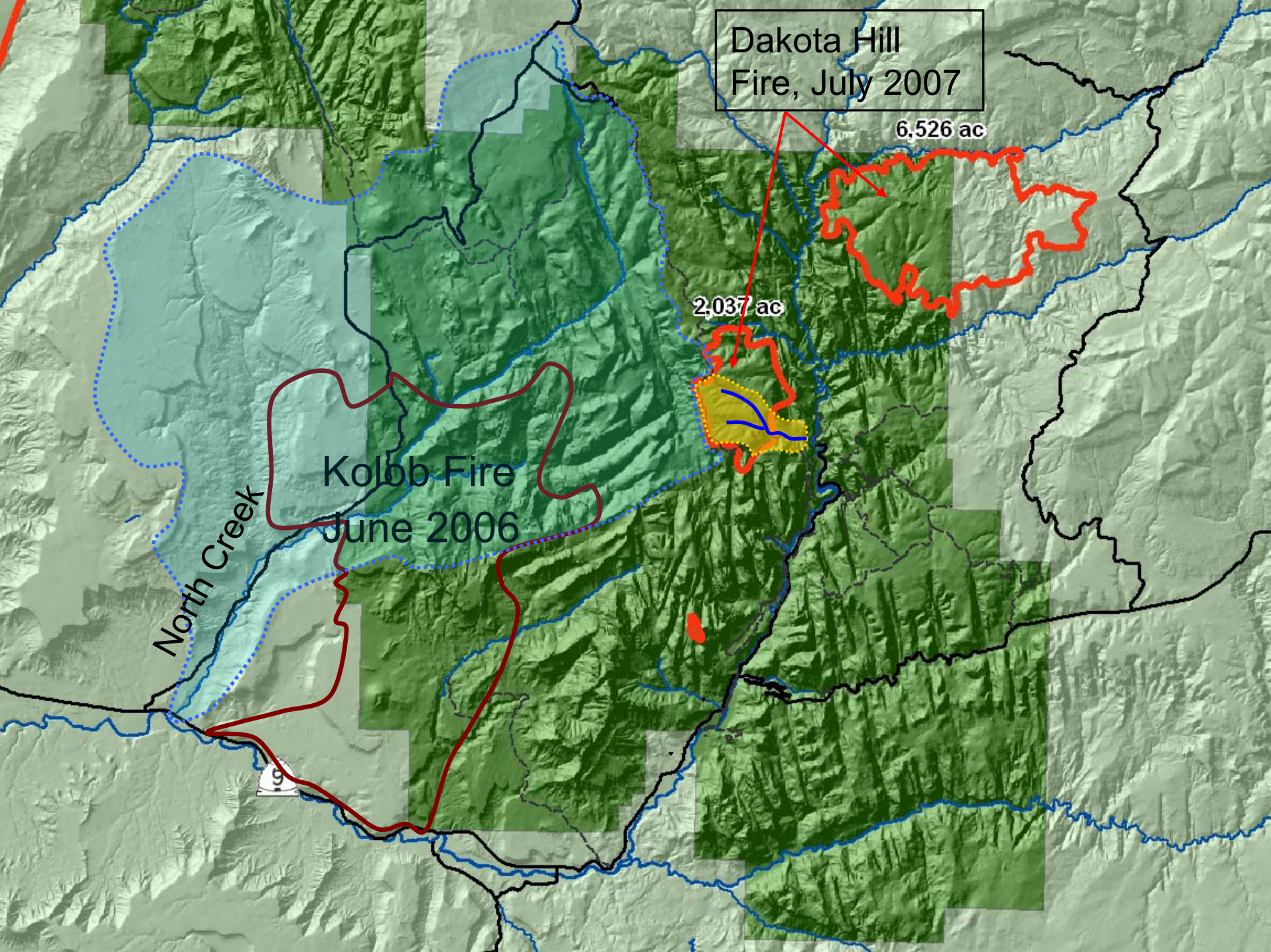
6,526 ac

2,037 ac

Kolob Fire
June 2006

9





Dakota Hill
Fire, July 2007

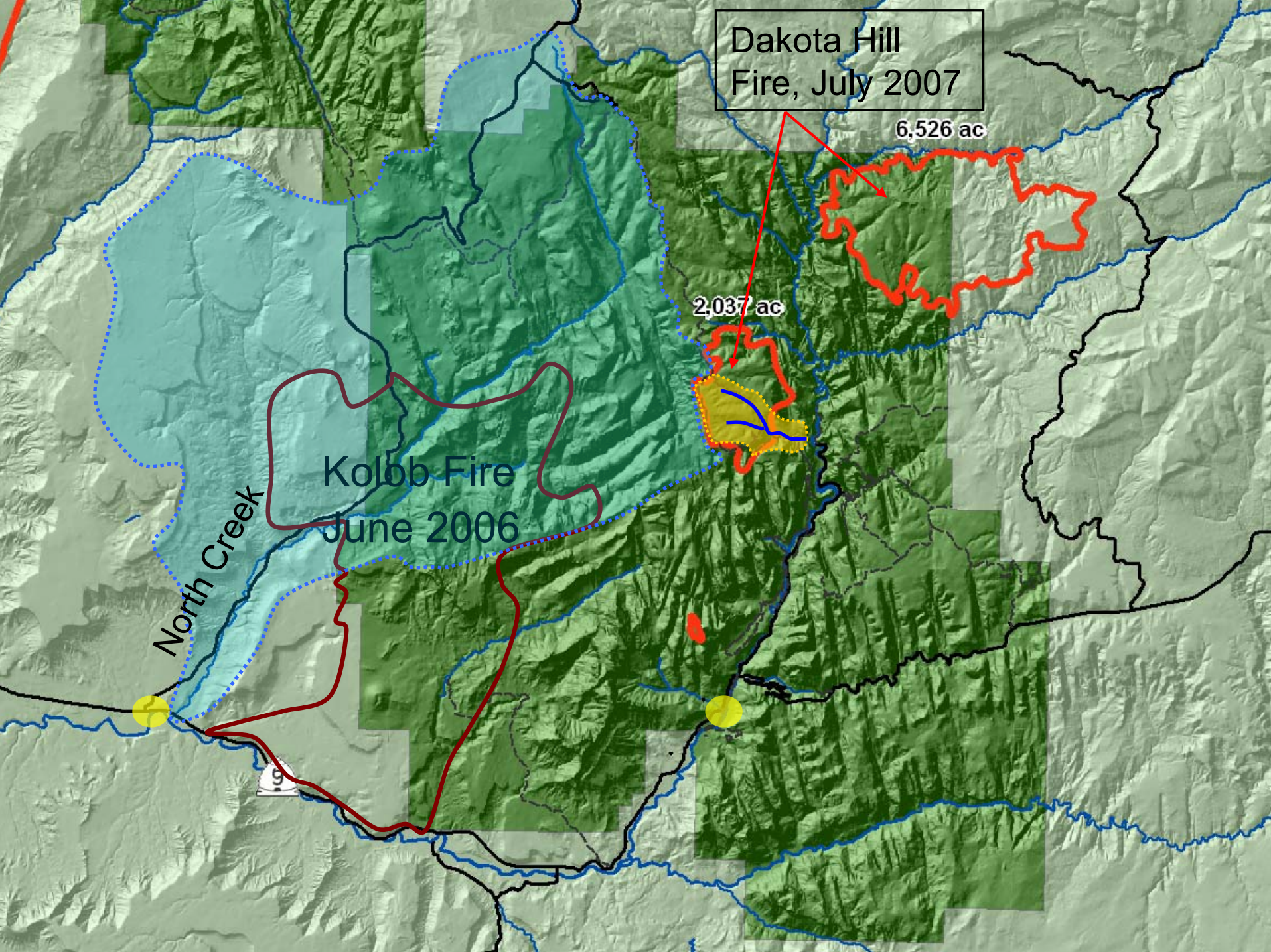
6,526 ac

2,037 ac

Kolob Fire
June 2006

North Creek

19



Dakota Hill
Fire, July 2007

6,526 ac

2,037 ac

Kolob Fire
June 2006

North Creek

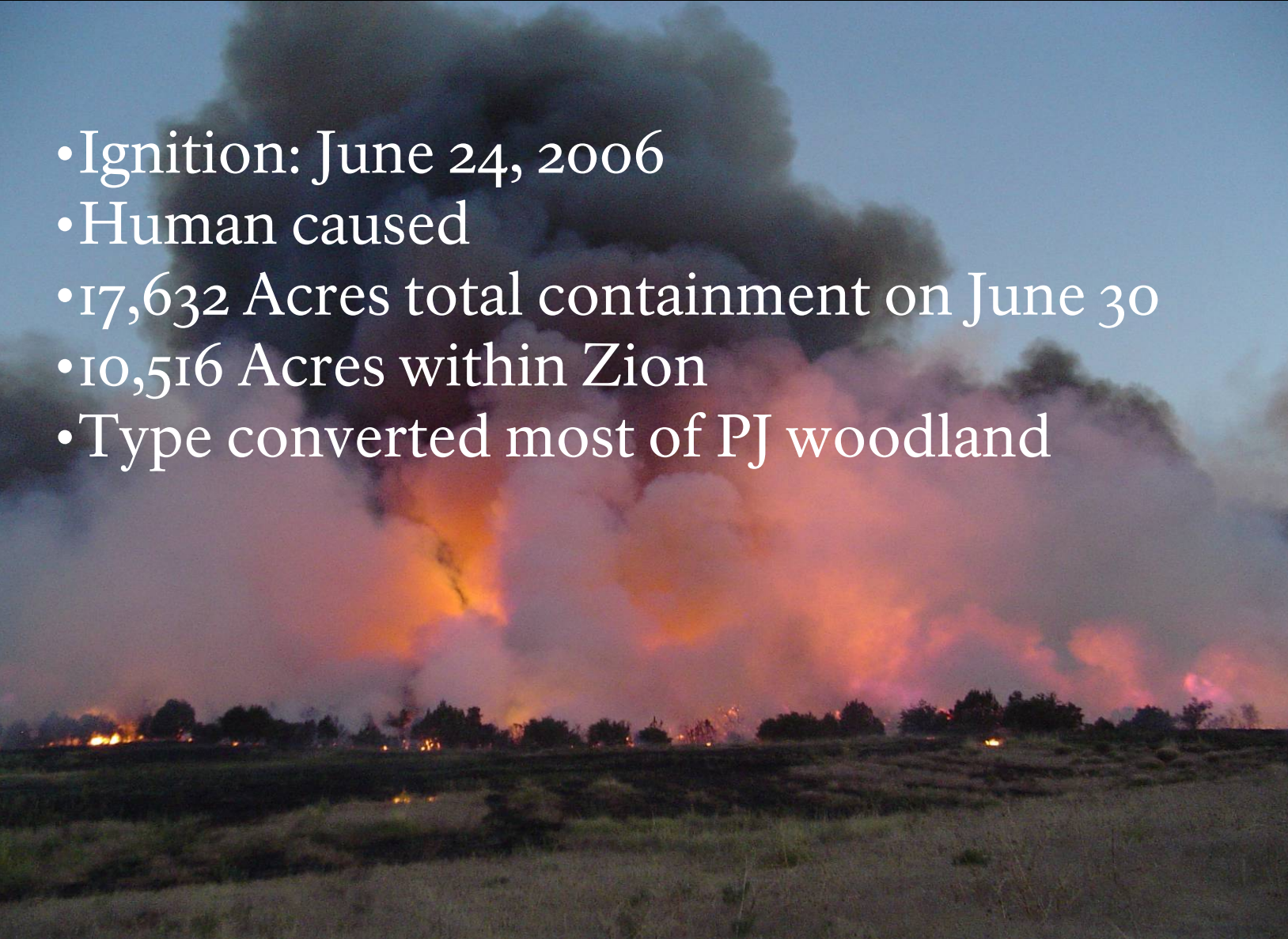
19

Kolob Fire



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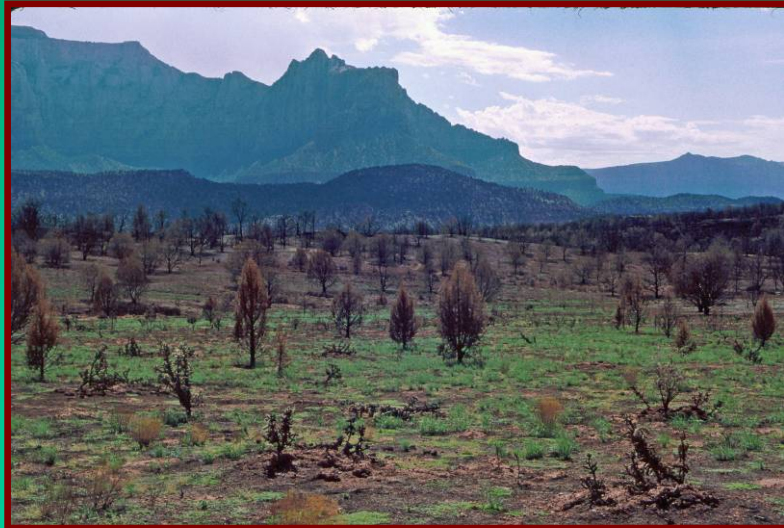
- Ignition: June 24, 2006
- Human caused
- 17,632 Acres total containment on June 30
- 10,516 Acres within Zion
- Type converted most of PJ woodland



Kolob Fire



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Watershed Response



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Watershed response is typically quite variable and dependent on many factors, with burn intensity being a primary factor.

Neary et. al. (2005) reports an increase in post-fire flood peaks of up to 100 fold, with the duration of the effect being 2 – 15 years (4-6 typical).

Watershed	Watershed % Burned	Post-Fire Bulked Increase in Peak Flow	
		10yr15min	10yr1hour
North Creek at Sunset Ranch	10%	6%	6%
North Creek at Staples Ranch	10%	6%	6%
North Creek at Highway 9	10%	6%	6%
Coal Pits at Highway 9	33%	19%	19%

From Parenti, Michael and Suzanne Loadholt, 2006. Kolob Fire BAER Plan, Soil and Watershed Assessment

Values at Risk



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Values at Risk



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Dakota Hill Fire, July 2007



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- Lightning Ignition, multiple
- 7,663 Acres
- PJ, Ponderosa Pine & Gamble Oak



Dakota Hill Fire

Telephone Canyon Watershed & Ash Deposits on NFVR



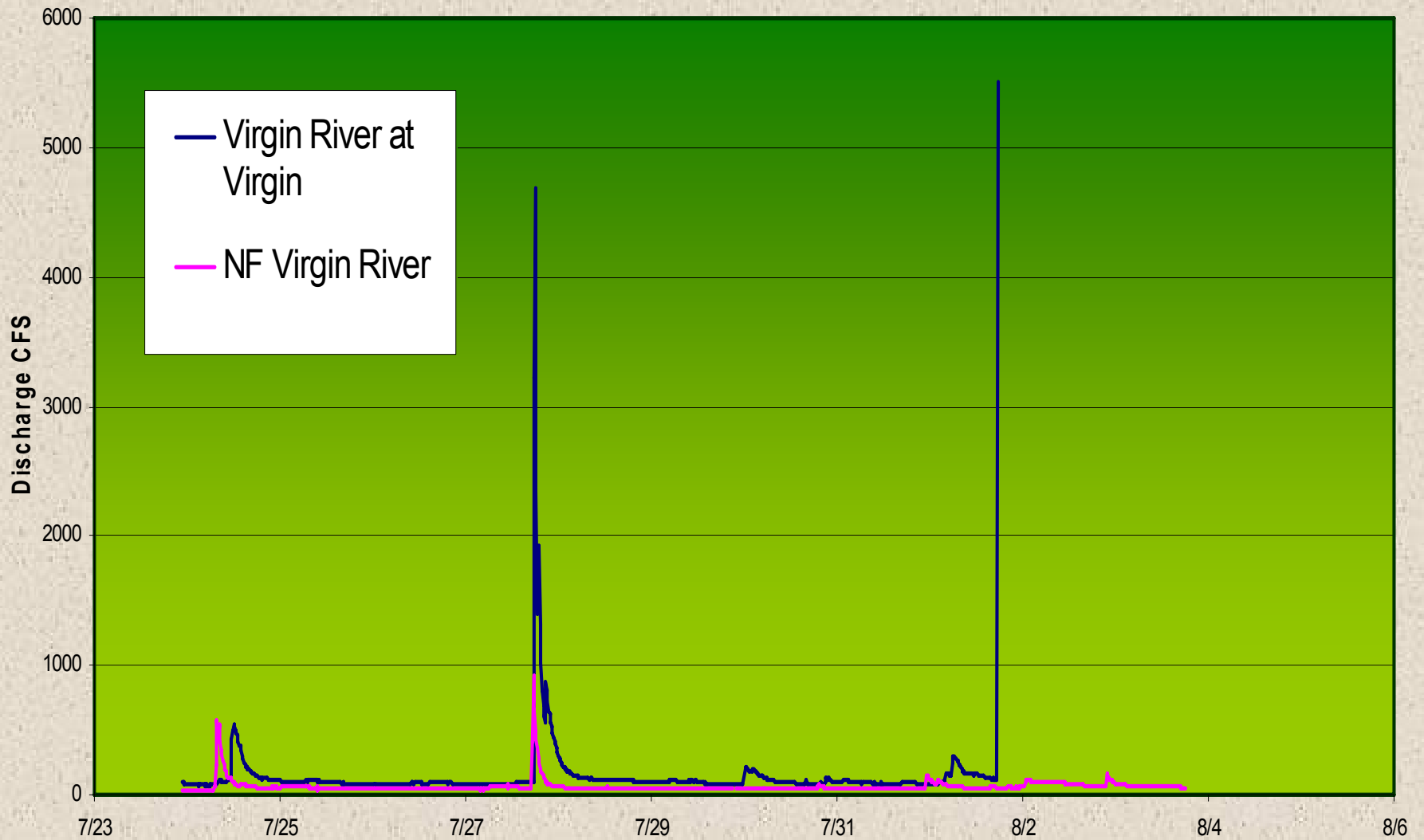
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This is the site of a wildfire caused by an illegal campfire on April 30, 1992. The fire cost taxpayers in excess of \$50,000.



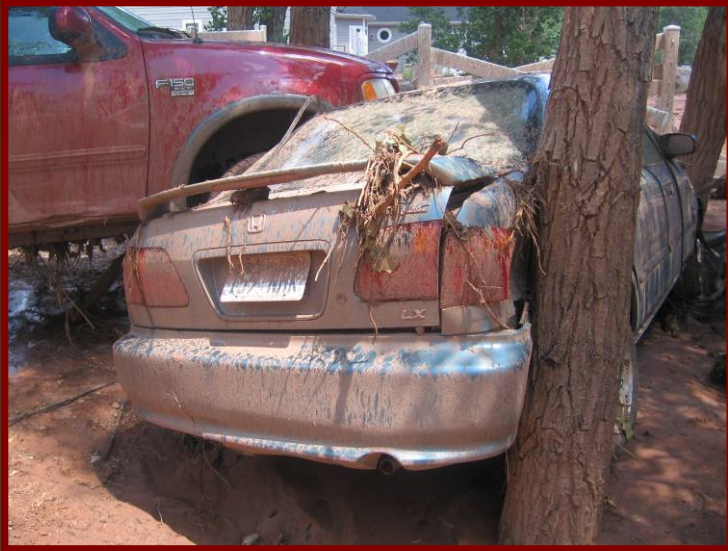
July and August Discharge for NF Virgin River and Virgin River at Virgin



Staple's Compound - Post Flood



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Staple's Compound - Post Flood



RV Park at Highway 9 Bridge



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USGS Gage at Highway 9 Bridge



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2 Fish Kills
Downstream
of ZION

Coalpits Wash



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Exotic Grass Fire Cycle – Losing Ecological Integrity



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Early Plateau Trials in Zion



**2 years Post
Application
April '04
(Less continuous fuel)**

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Treatment with
Imazipic (Plateau®)
(Selective for C3
Plants)



Dominance of Annual Exotics

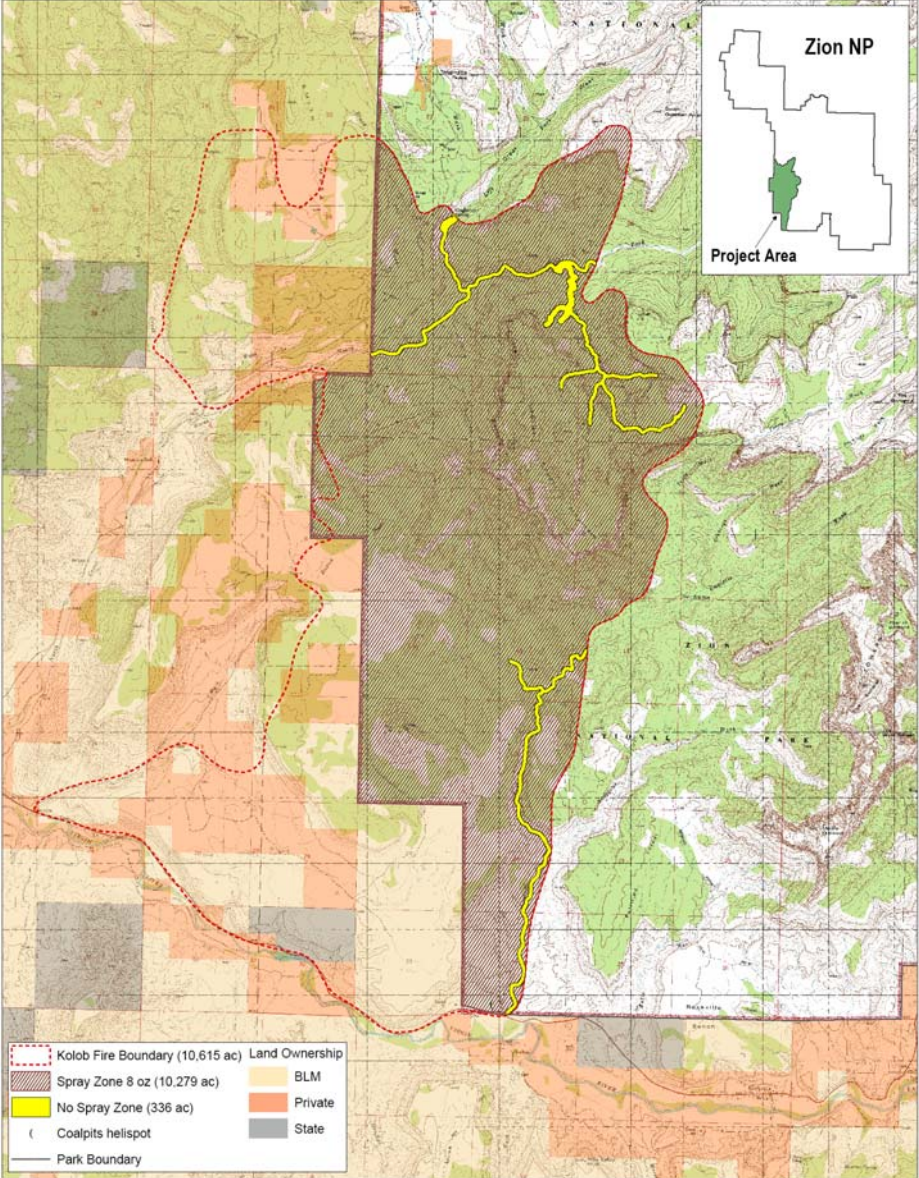


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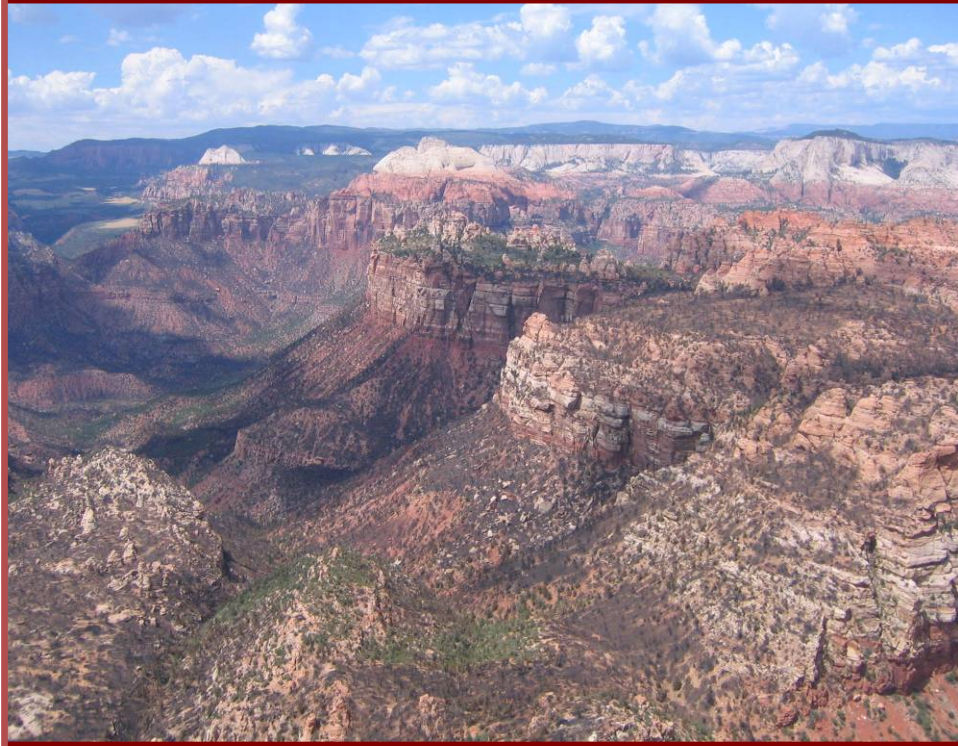
Map Projection: Tranverse Mercator,
UTM Coordinate System, Zone 12,
Datum: NAD 1983

Map produced by Zion National Park,
Resource Management & Research, GIS Program



The National Park Service
does not assume responsibility for information
accuracy, precision, or completeness of data
as displayed on this map.

November 2006



Herbicide Worst Case Analysis 1 - assuming aerial application of herbicide directly to the stream surface at a rate of: Imazapic at 8 oz./acre, and Glyphosate at 16 oz./acre.

Segment	Channel Length (miles)	Channel Length (feet)	Channel Average Width (feet)	Channel Depth at center (feet)	Cross section Area (ft ²)	Stream Surface Area (ft ²)	Stream Surface Area (acres)	Volume of Water (liters)	Volume of Herbicide applied to Water Surface (Ounces)		Resulting Concentration of herbicide (mg/l) ¹	
									Imazapic @ 8 oz./acre	Glyphosate @ 16 oz./acre	Imazapic @ 8 oz./acre	Glyphosate @ 16 oz./acre
North Fork, Upstream of Deep Creek	5.5	29,040	20	1.5	15	580,800	13.33	12,300,000	107	213	0.00026	0.00051
North Fork, Downstream of Deep Creek	4.3	22,704	50	2.5	62.5	1,135,200	26.06	40,200,000	208	417	0.00015	0.00031
Combined	9.8	51,744			77.5	1,716,000	39	52,500,000	315	630	0.00018	0.00035
Levels of Concern ²								Drinking Water			5.0	0.7
								Fish Toxicity			>100	>1.0

¹ Concentrations assume a specific gravity for the herbicide of 1.0 so milliliters = milligrams.

² Levels of Concern

Glyphosate

Drinking Water Standard (EPA): 0.7 ppm (mg/l)

LC₅₀ for most fish species > 1.0 mg/l

Imazapic

Chronic Level of Concern for Drinking Water for infants and children 5,000 ppb (5.0 ppm ≈ 5.0 mg/l.)

LC50 for bluegill sunfish, rainbow trout and water fleas >100mg/l.

Worst Case Analysis 2 - assuming 100% of the herbicide applied to the burned area is washed into the North Fork of the Virgin River by a single large (50-year) flood event.

[illegible]

Aerial Herbicide Application



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Aerial Herbicide Application



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Treatment Results – 1 year post fire



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Attempting to buy time
while we increase
native seed



COST \$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$\$



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- Aerial Herbicide (8839 acres)
 - » \$17.74/acre (herbicide)
 - » \$22.57/acre (application)
 - » Total: \$356,300.00
- Aerial Seeding (493 acres)
 - » \$245.00/acre (seeds)
 - » \$21.00/acre (application)
 - » Total: \$131,000
- Overhead Costs
 - » 2.70/acre
 - » Total: \$29,000
- Grand Total (Treatments) : \$ 517,000
- Monitoring (Northern Arizona University): \$369,000

Extreme evens in the Santa Catalina Mountains

Impact of Recent Extreme Arizona Storms

By C. S. Magirl, R. H. Webb, M. Schaffner, W. Lyon, P. G. Griffiths, C. Shoemaker, C. L. Unkrich, S. Yatheendradas, P. A. Troch, Pytlak, D. C. Goodrich, S. L. E. Desilets, A. Youberg, and P. A. Pearthree

Eos, Vol. 88, No. 17, 24 April 2007

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10, 20 and 90-year flood
events on consecutive
days (July 2006)

Aspen Fire 3 years before

Fig. 1. Map of hillslope failures, rainfall gages, and stream gages within the Santa Catalina Mountains north of Tucson, Ariz. The elevation contour interval is 100 meters. Locations of hillslope failures were mapped with helicopter-based and ground-based reconnaissance.

